Allocation and Stakeholder Modeling of TMDLs

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March 1, 2006

This work was performed under the auspices of the U. S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under Contract No. W-7405-Eng-48.

ADVISORY COUNCIL MEETING
for
Dominguez Channel, and Los Angeles and Long Beach Harbors TMDLs

UCRL-PRES-219651

Overview of NETL/LLNL TMDL Modeling Efforts

- *Objectives*
- *Allocation Modeling*
- *Stakeholder Modeling*
- *Next Steps*
- *Points of Contact*

Allocation & Stakeholder Modeling for TMDLs

Project Objectives

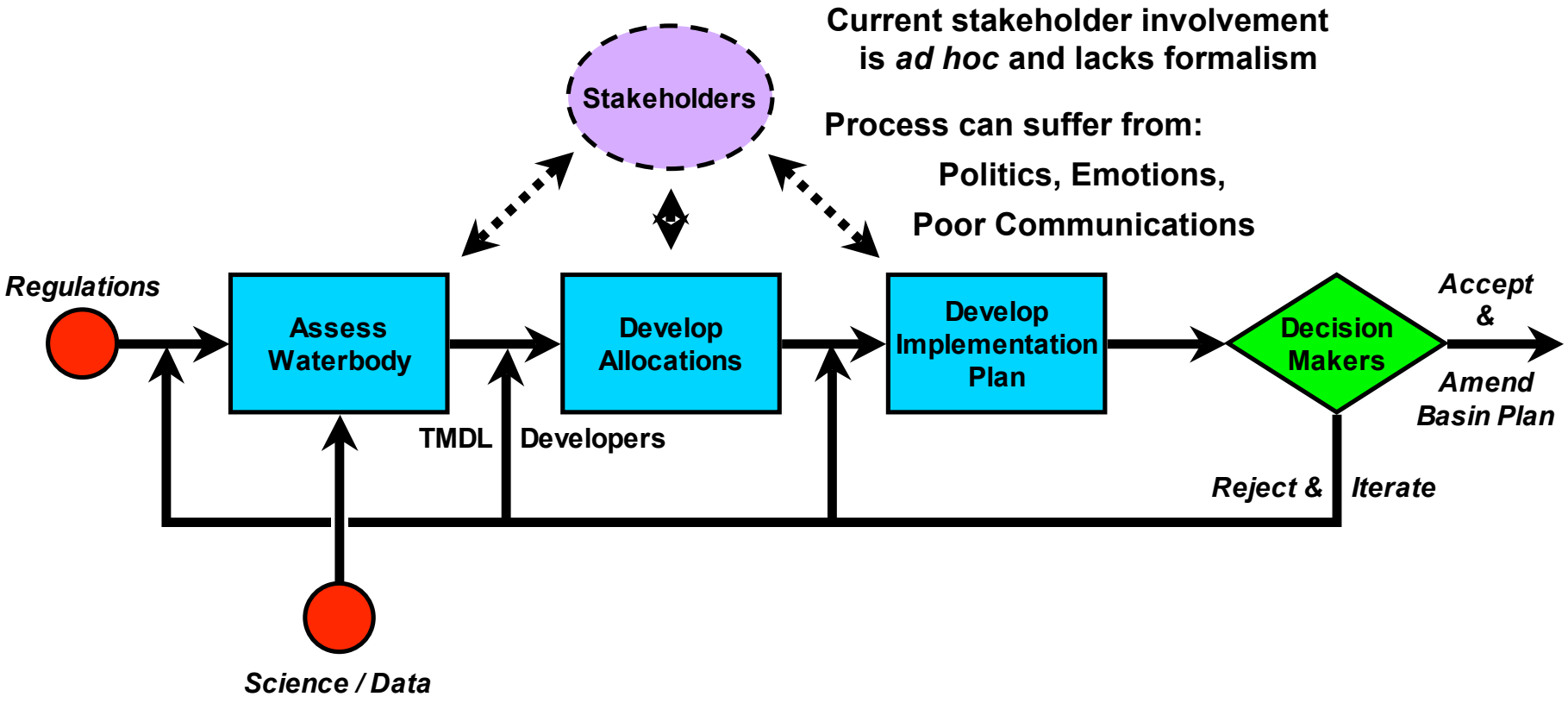
- ***Develop tools to improve allocation process and stakeholder involvement for TMDLs***
- ***Create models that can be used nationwide***
- ***Obtain validation and acceptance of tools from EPA***
- ***Initial focus of effort is on heavy metals TMDL for Dominguez Channel in the LA Basin***

- **Collaboration between:**

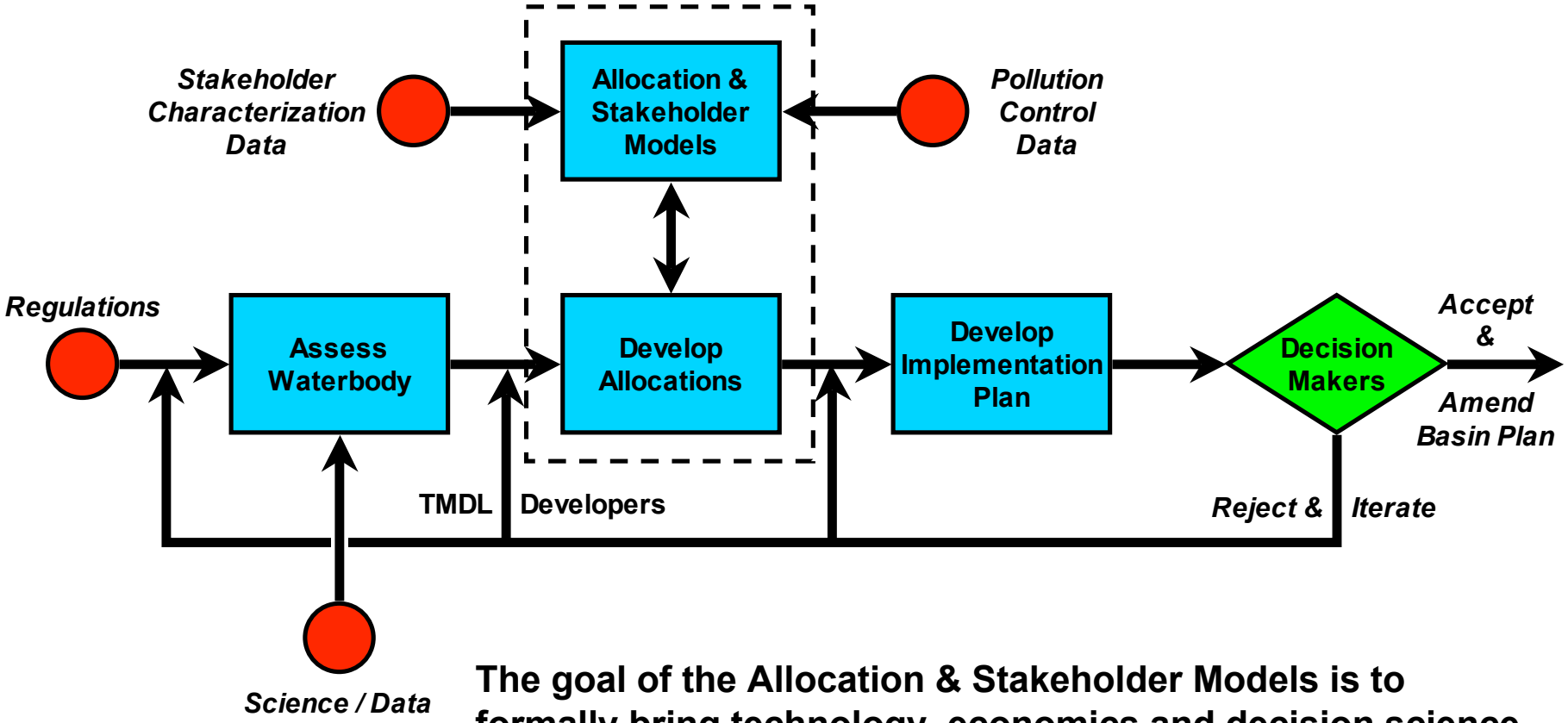
  LLNL – Lawrence Livermore National Laboratory

  NETL – National Energy Technology Laboratory

Current Approach to TMDL Development



An Integrated Approach to TMDL Development



The goal of the Allocation & Stakeholder Models is to formally bring technology, economics and decision science into the allocation process --- *improving communications & reducing emotions!*

Simplified Waste Load Allocation Example

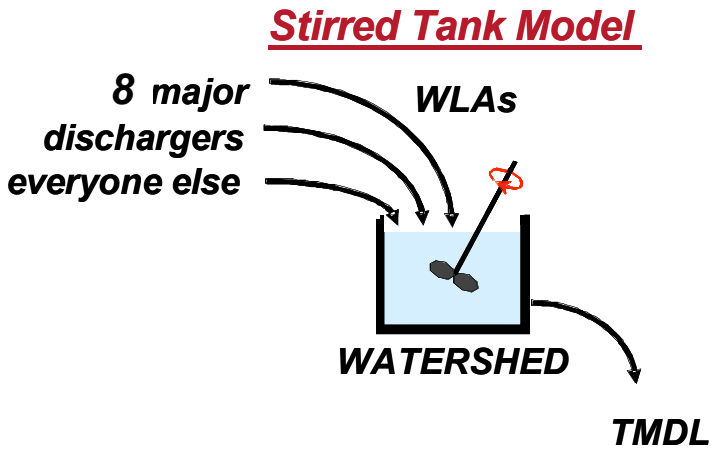
TMDL = WLA + LA + MOS

- **Reduce "heavy metal" from industrial and municipal wastewater dischargers**
  - 8 major discharges and everyone else
  - estimate individual discharger's costs to achieve WLA allocation for 7 different allocation methods
    - ***How do these costs change when the rules change?***
    - ***Who pays more who pays less?***
    - ***Which method gives lowest total cost?***
    - ***How can this be achieved?***
  - economies of scale reduce individuals costs to achieve WLA
  - stirred-tank model of watershed

Simplified Waste Load Allocation Example

TMDL = WLA + LA + MOS

- **Allocation Methods**
  1. Equalization of Effluent Concentrations
  2. Minimum Total Treatment Cost
  3. Equal Percent Removal
  4. Percent Removals Proportional to Raw Loads
  5. Equalization of Waste Loads
  6. Equalization of Waste Load Reductions
  7. Equalization of Costs for Reductions
- **Impacts**
  - Trading
  - Increased Discharges

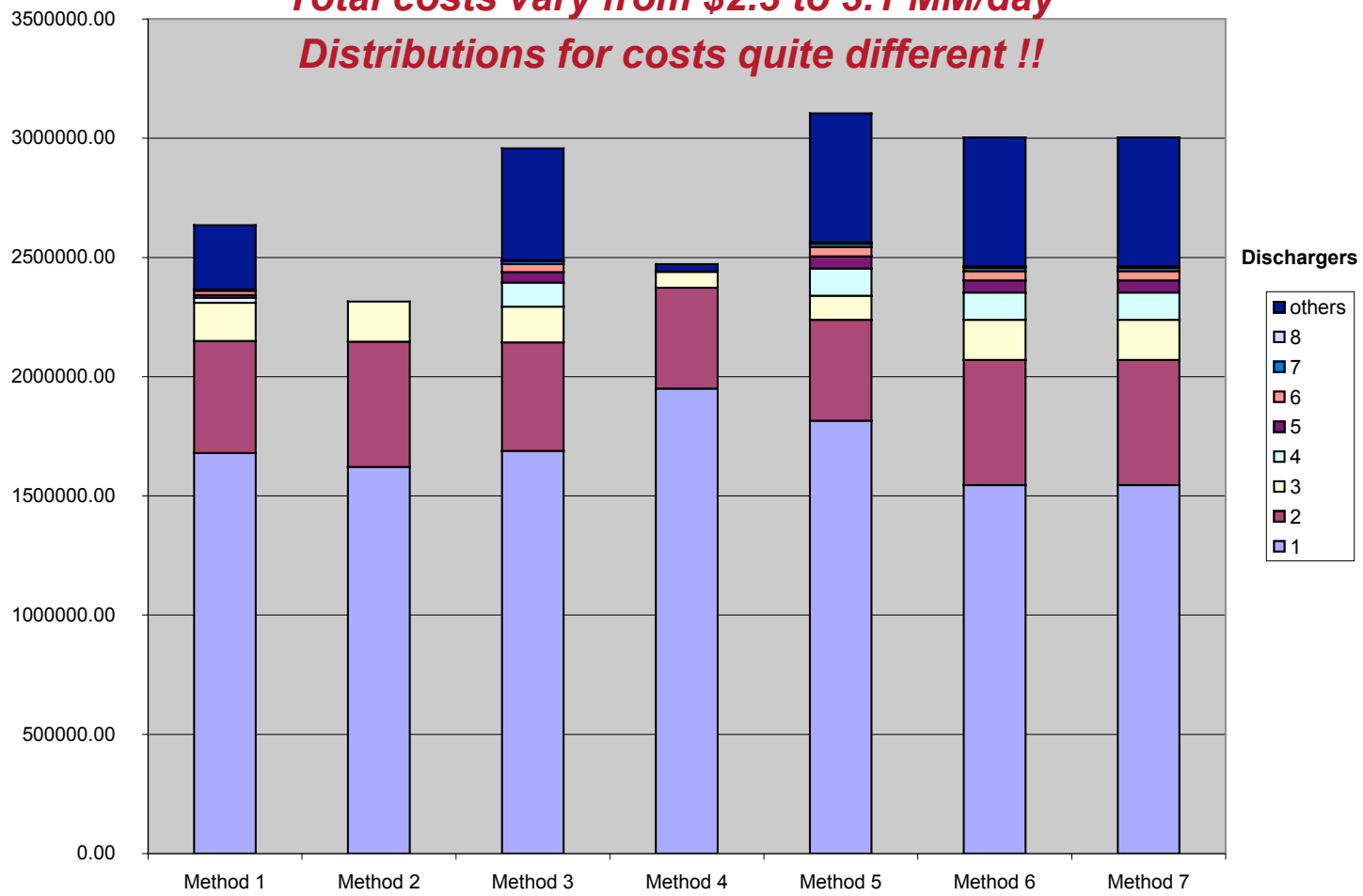


Simplified Waste Load Allocation Example

Treatment Costs Summary

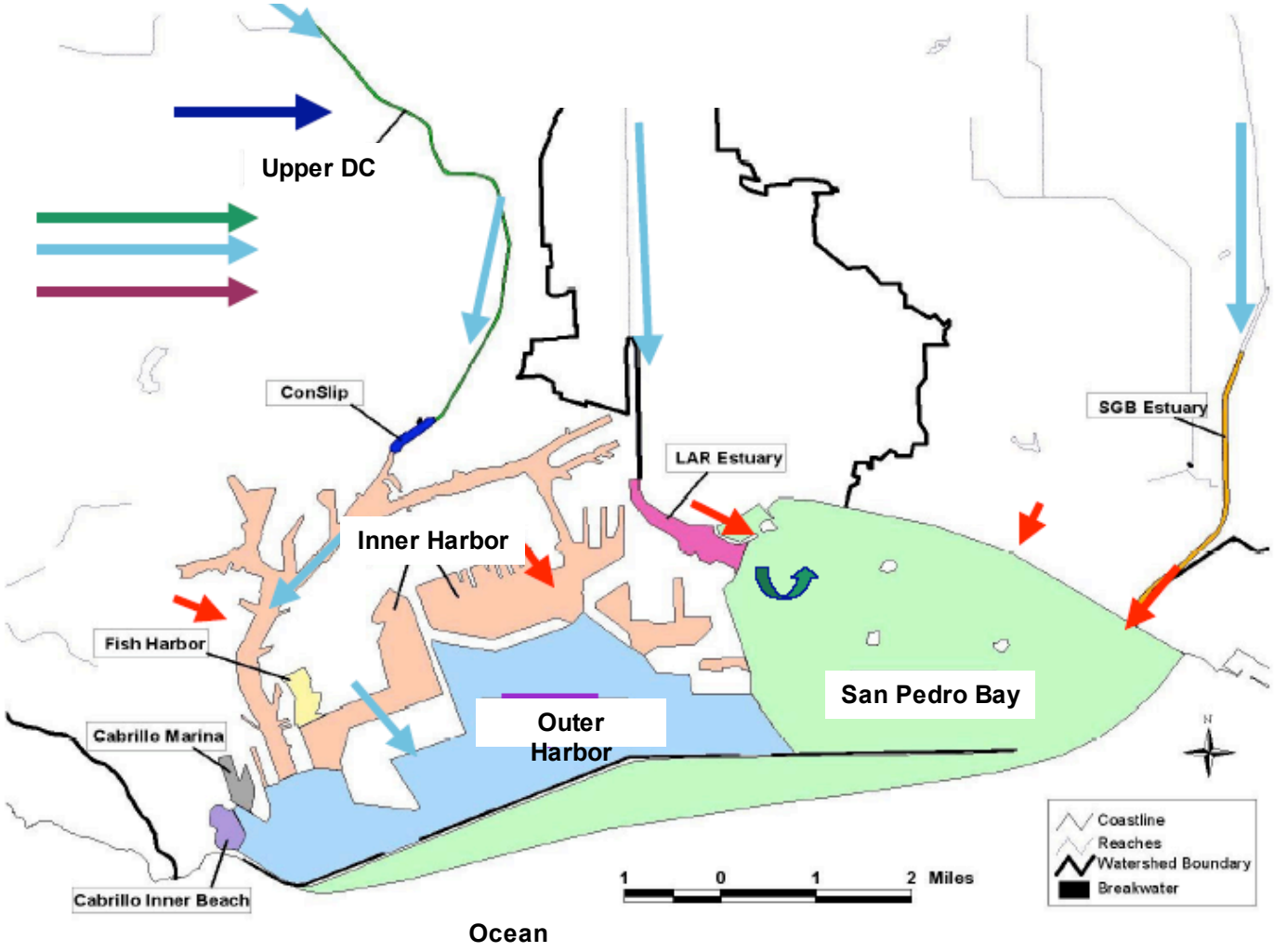
Total costs vary from $2.3 to 3.1 MM/day

Distributions for costs quite different !!



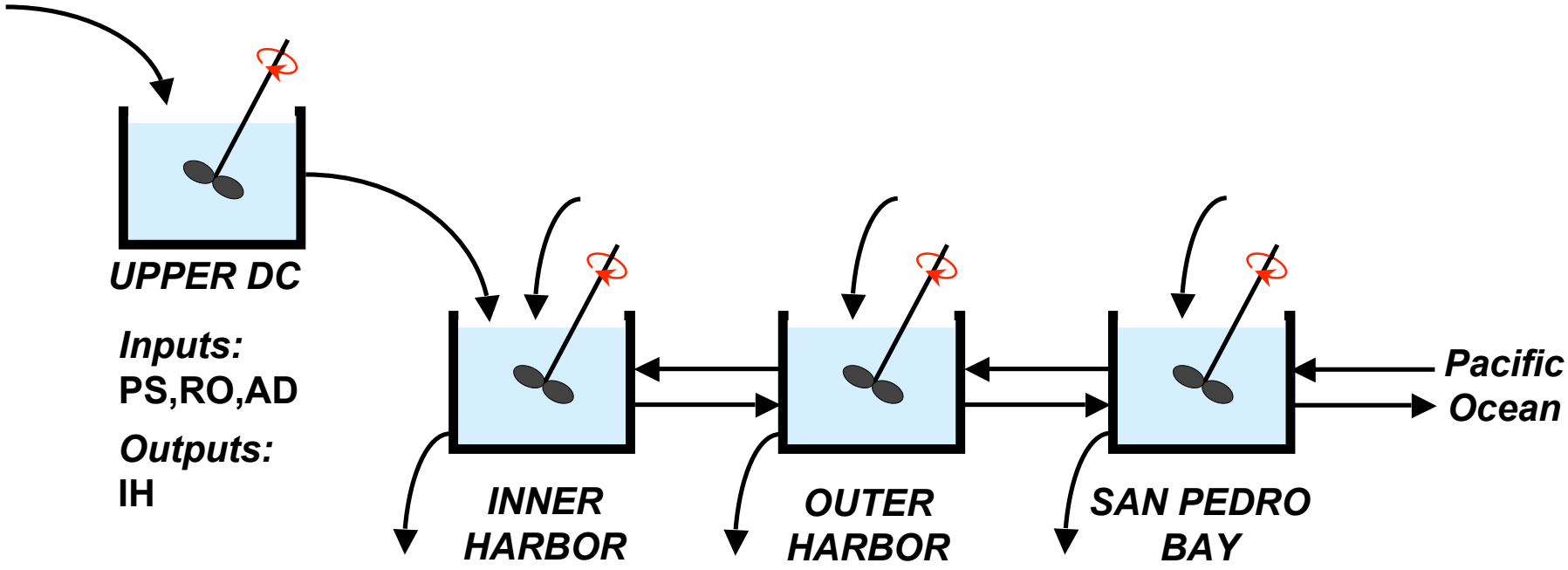
Simplified Waste Load Allocation Example
Conclusions

- How allocation is done has large impact on total costs and who pays what
- In theory trading, or some other mechanism can drive costs down and still achieve same overall reductions
- How allocation is applied, *i.e.* total mass or concentration-based waste loads, has big impact on future treatment costs if water usage increases



From Stakeholders Meeting Sept. 15, 2005

Multi-Tank Model being Developed for DC / LAH / LAB Metals TMDL



INNER HARBOR	OUTER HARBOR	SAN PEDRO BAY
Inputs: UDC,OH,PS,RO,AD	***Inputs:*** IH,SPB,PS,RO,AD	***Inputs:*** OH,PO,PS,RO,AD, SGB,LAR
Outputs: UDC,OH,SED	***Outputs:*** IH,SPB,SED	***Outputs:*** OH,PO,SED

Development of a Stakeholder Preference Model

1. Identify stakeholder groups
2. Conduct interviews to identify important “relevant” issues
3. Categorize issues into attributes with distinct differences
4. Review structured list of issues and attributes with stakeholders to assure differences are easily understood
5. Conduct stakeholder interviews to calibrate issues and attributes
6. Develop software model with issues and attributes data
7. Conduct preference tradeoff with stakeholder groups
8. Use model to evaluate proposed implementation plans

Dominquez Channel Stakeholder Groups and High-Level Objectives

Stakeholders	Transparency	Establishing a well characterized watershed	Schedule	Cost	Flexibility
Non-profit Organizations	X	X	X		
Industry		X	X	X	X
City Government			X		
Government Agencies		X	X		

Illustrative Implementation Plan Selected for Evaluation

Attribute	Plan 1	Plan 2
Cost	Less than 250,000	Greater than 250,000 and less than 1,000,000
Trading	Allows trading	Does not allow trading
Discharge Estimation	Estimates some source discharges	Estimates all source discharges
Third Party Monitoring	Allows third party monitoring	Does not allow third party monitoring
Timetable	5-7 years	2-5 years
Upgrades	Requires System Upgrades	Does not require System Upgrades
Characterization Plan Selection	Non-profit organizations are not included	Non-profit organizations are included
Parties Who Agree Upon Plan	NEPDES and LARQWCB	NEPDES

Ranking for the Illustrative TMDL Plans

Alternative	Utility	Relative Preference
Plan 2	0.676	
Plan 1	0.512	

Non-Profit Organizations

Government Agencies

City Government

Industry

- **"Stacked bar ranking" of results created in Logical Decisions for Windows.**
- **Utility ranges from 0 to 1; where 1 represents the highest possible stakeholders satisfaction and 0 represents the lowest possible stakeholder satisfaction.**
- **The "non-profit," "city government," and "government agencies" stakeholders prefer Plan 2.**
- **Industrial stakeholders preferred Plan1.**

Stakeholder Input and Allocation Model Next Steps

- Set up allocation model using results from current monitoring and hydrodynamic modeling on watershed.
- Link allocation model and stakeholder model through GIS for visualization and analysis.
- Use GIS visualization to help refine stakeholder input process.
- Develop documentation for wider application.

Points of Contact

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